A STUDY OF OVERGROUND VERSUS TREADMILL TRAINING TO IMPROVE WALKING ABILITY IN PATIENTS WITH STROKE

A dissertation submitted in partial fulfillment of the requirement for the degree of

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SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF
'MASTER OF PHYSIOTHERAPY'
AT THE TAMILNADU DR. M.G.R MEDICAL UNIVERSITY,
CHENNAI

(APRIL 2011)

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1. INTERNAL EXAMINER

2. EXTERNAL EXAMINER

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CHENNAI

(APRIL 2011

DECLARATION

I hereby declare and present my project work entitled "**A STUDY OF OVERGROUND VERSUS TREADMILL TRAINING TO IMPROVE WALKING ABILITY IN PATIENTS WITH STROKE"**

The outcome of original research was undertaken and carried out under the guidance of Professor **Mrs.S.SEEMA, MPT, R.V.S COLLEGE OF PHYSIOTHERAPY, SULUR, COIMBATORE.**

I also declare that the material of the project work has not formed in anyway the basis for the award of any other degree previously from **The Tamil Nadu Dr. M.G.R Medical University, Chennai.**

SIGNATURE

ACKNOWLEDGEMENT

I express my thanks to **God Almighty** for providing me the wisdom and knowledge to complete my study successfully.

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1. INTRODUCTION

Stroke is defined as rapidly developing clinical signs and symptoms of a focal neurological disturbance of cerebral function with symptoms lasting 24 hrs or longer, or leading to death, with no apparent cause other than of vascular origin (WHO). Stroke is the third leading cause by death and most common cause of disability among adults. Ischemic stroke is the common type, affecting about 80% of individuals with stroke.

Major risk factors of stroke identified in India are hypertension, diabetes, high cholesterol, heart disease, alcoholism and family history of stroke. Clinically a variety of deficits are possible including changes in the level of consciousness, impairment of sensory, motor, cognitive, perceptual and language function. Motor deficits are characterized by paralysis or weakness on the side of the body opposite the side of lesion.

The prevalence of stroke in India is higher in urban compared with rural area (Joshi et al 2006). Prevalence of stroke varies in different regions and ranges cities, Ethnic, socioeconomic and dietary factors may be responsible for this variance.

The frequency of the MCA stroke is reported to be more than 80 cases per 100000 people. The national commission on macro economics and health estimated that the number of strokes will increase from 1,081,480 in 2000 to 1,667, 372 in 2015(Shah Mathur 2006) mortality due to strokes has increased by 8.9% from 1998 to 2010

Age is the strongest risk factor for both cerebral infarction and primary intracerebral hemorrhage. The incidence of stroke doubles with

reach successive decade over the age of 55 yrs, with an overall rate 0 .2/ 1000 in those aged 45 – 54 yrs and 10/1000 in those age over 85 yrs.

Hypertension > 140/90 mmHg is directly responsible for 57% of all strokes deaths and 24% of all coronary disease deaths in India at an under estimate, these are31.5 million hypertensive in rural and 34 million in urban populations. Around 12% of all strokes occurred in population below 40 yrs. Men have a 25- 30% increased chance of having a stroke. Almost one in four men and one in five women aged 45 yrs can expect to have a stroke. .

The objective of stroke rehabilitation is to enable the individual patient to achieve their full potential and to maximize benefit from training inorder to attain the highest possible degree of physical and psychological performance. Stroke is a major cause of long term disability and has potentially enormous emotional and socio economic consequences for patients, their families and health service. More than 3 million stroke survivors live with residual disabilities and motor deficits. .

The ability to walk is one of the most important goal in stroke rehabilitation. Gait impairment is a significant contributor to long-term disability after stroke. Gait recovery in stroke survivors is variable.

Wade et al showed that only 22% of 45 patients who could not walk as a consequence of stroke were able to walk normally within 3 months of recovery. Although early rehabilitative intervention in walking training is generally recognized an beneficial in patients with stroke.

Gait training on a treadmill is a method of treating walking impairment that is becoming popular. Moreover, it has been shown that higher intensities as walking practice result in better outcomes after stroke. The use of a treadmill may increase the speed of gait.

The outcome was measured using Functional Ambulation category scale and 10 meter walk test

The ultimate goal of stroke rehabilitation is to achieve a level of functional independence necessary for returning home and to integrate fully as possible into community life.

1.1 Statement of problem

This is a study of the effectiveness of over ground versus treadmill training to improve functional walking ability in patients with stroke

1.2 Aims and objectives of the study

1.2.1 Aim

The aim of the study is to find out the differential effect of overground and treadmill training on functional walking ability and cadence in stroke patients.

1.2.2 objectives

- To find out the effect of over ground training to improve functional walking ability and cadence in stroke patients.
- To find out the effect of treadmill training to improve functional walking ability and cadence in stroke patients.
- To compare the effectiveness of over ground and treadmill training to improve functional walking ability and cadence in stroke patients

1.3 Need And Significance of the study

Loss of walking ability is major problem after stroke and recovery of walking is a priority goal for most of the patients. According to survey conducted by national stroke association it is reported that among the most potential after effects of stroke they experience, they are more concerned

with regaining their movement and mobility. Impaired walking ability contributes to functional disability after stroke

It is needed to evaluate effectiveness of treadmill gait training to improve functional walking ability and cadence in stroke patents.

1.4 Hypothesis

Null hypothesis

There is no significant effect of treadmill gait training compared with overground gait training to improving functional walking ability and cadence in stroke patients

Alternate Hypothesis

There is significant effect of treadmill gait training compared with overground gait training to improving functional walking ability and cadence in stroke patients

1.5 OPERATIONAL DEFINITIONS

Stroke

Stroke is defined as rapidly developing clinical signs and symptoms of a focal neurological disturbance of cerebral function with symptoms lasting 24 hrs or longer, or leading to death, with no apparent cause other than of vascular origin.

Gait

It is translatory progression of body as a whole which is produced by co-ordinated and rotated movements of body segment.

Over ground gait training

Walking on ground

Treadmill

Treadmill is a machine consisting of an endless belt on which a person can walk or jog without changing place.

Walking speed

Distance travel per unit time

Cadence

Number of steps per minute

2.REVIEW OF LITERATURE

Literature regarding general aspects of stroke

Lipska K et al., (2007) Key component of metabolic syndrome and smoking are associated with ischemic stroke in young south Indian adults.

Randhawa W.K. (2006) Hypertension is directly responsible for 57%of all stroke deaths and 24% of all coronary heart disease death in India.

Humphries S (2004) several genetic determinants contribute to stroke risk of these, carotid intimal medial wall thickness is particularly relevant because it is a surrogate measure of sub clinical arteriosclerosis and a strong predicator of future ischemic stroke of twins , siblings and families have provided significant evidence for heritability but the genes involved have not bee identified

Perttu J. Lindsberg (2003) chronic infection (eg infection with chlamydia pneumonia or helicobacter pylori) were found to increase the risk of stroke. Acute and exacerbating chronic infection may act by activating coagulation and chronic infections and may contribute to atherogensis. Genetic predisposition of the inflammatory host response may be an important co determinant for atherogensis and stroke risk.

Dalal PM (2002) current demographic trends suggest that the Indian population will survive through the peak year of occurrence of stroke (age 55- 65 years). Recent community surveys form many region

of Indian show a crude prevalence rate of stroke presumed to be of vascular origin in the range of 200 per 100000 person

Anand K et al., (2001) The prevalence of stroke in India was estimated was 203 per 100000 populations above 20 years to a total of about 1 million cases. Around 12% of all stroke occurred in population below 40 years..

Charles DA Wolfe (2000) The overall incidence rate of stroke is around 2- 25 per thousand population. The incidence of stroke doubles with each successive decade over age of 55 years with a over all rate 0.2/ 1000 in those aged 45 – 54 years and 10/1000 in those aged over 85 yes men have a 25 – 30% increased chance of having a stroke.

Literature regarding Lower limb impairment and recovery after stroke

Enzinger (et al., 2008) Although knowledge concerning cortical reorganization related to upper limb function after stroke is growing similar data for lower limb movements are limited.

Lutt A Ret al., (2005) Lower extremity paresis possess significant disability to chronic stroke survivors. Unlike for the upper extremity , cortical adaptations in networks controlling the paretic leg have not been characterized after stroke.

Kautz Sa (2003) after stroke, paretic leg motor impairment is typically viewed as unilateral control deficit. However, much of the neural circularity controlling normal key function is organized bilaterally

to *produce* coordinated, task specific activity in the two legs. Thus as a result of contralesional neural control processes, paretic leg motor pattern generation may be substantially influenced by the non paretic leg seismometer state during bilateral lower limb tasks.

Ichiro myai et al (1999) MCA lesion that includes premotor cortex reduces mobility outcome. The premotor cortex (Brodmann 6) contribute uniquely to proximal upper and lower limb power and plays a role in the organization of motor behaviors.

Mercier C et al., (1999) Following a stroke changes in motor nerves , motor units and muscles fibers occur that can lend to impaired force production. The decrease in force production not only follows from a decrease in force generation in each muscle, but also from impairments in muscle co-ordination both around and between joints.Therefore, hemiparetic patients can sometimes produce large amounts of force but have no control on the direction of this force.

Literature regarding treadmill training

Marco France schinic (2009) This study aimed to assures the effectiveness of gait training using bodyweight support on a tread mill compared with conventional gait training for people with stroke.

Marcus Pohl(2007) : examined a new gait training strategy for patients with stroke seeks to increases walking speed through tread mill training this study compares the effect of structured speed dependent tread mill training with limited progressive tread mill training and conventional gate training on clinical outcome measures for patients with hemi paresis.

Wen CS (2006) Examine the effectiveness of tread mill walking training for restoration of major function, balance and walking speed in patients with stroke.

Yocheved Laufer (2001) The objective of the study was to compare the effect of conventional gait training with treadmill training on the restoration of gait in people with hemi paresis following stroke.This study suggest that treadmill training may be more effective than conventional gait training for improving gait parameteres

Li – yuan chen (2000) Analyzed the kinematics and EMG of walking on a treadmill. Sixteen male healthy subjects participated in the study. In the infortronic ultra flex gait analysis system was used to record the data. In this study the author found that walking on a inclined tread mill was the most stable pattern and the increased average muscle activity was noted.

S.Hesse (1995) Treadmill training was more effective regard to restoration of gait ability and walking velocity the tread mill training causes gait restoration non ambulatory patients with chronic pareses

Literature regarding outcome measurement

Rachael Lowe (2010) 10 meter walk test is well established for use in assessment of patients with stroke.45 patients with stroke participated in the study. Subjects performed to 10 meter walk test by using their usual walking speed. Gait speed and cadence were calculated

from the timed data. The10 meter walk test was shown to be valid and reliable for the assessment of walking ability of patients with stroke.

Van Hedel et al(2006) 10 meter walk test was valid and reliable for the assessment of walking cadence of patient with stroke

Mehrolz (2003) to determine the reliability, concurrent and predictive validity and responsiveness of the functional ambulation category (FAC) in hemi paretic patients after stroke. In the study 55 non ambulatory patients after first ever stroke with duration of illness between 30 and 60 days were included. Based on this study high test retest reliability and inter rater reliability were found. After examination the study shown that the FAC as excellent reliability, good concurrent and predictive validity and good responsiveness in patients with hemi paresis after stroke.

Da Cunha IT jr(2002) functional ambulatory category was valid and reliable for the assessment of walking ability of patient with stroke

3. RESEARCH DESIGN AND METHODOLOGY

3.1 Research design

The research design of this study is experimental.

3.2Variables used in the study

3.2.1 Independent variable

- Over ground gait training
- Treadmill training

3.2.2 Dependent variable

- Lower limb gait speed
- Cadence

3.3 Setting

The study was conducted in Nila Hospital,Kerala

3.4 Method of sampling

Random sampling technique

3.5 Sample Population

30 subjects and 15 in each group

3.6 Criteria for selection

3.6.1 Inclusion criteria

- First episode of right MCA stroke.
- Ability to walk on treadmill 0.2 km/hr with minimal to moderate assistance for atleast 2 minutes without rest.
- Onset of stroke not more than 90 days
- Age group between 45 – 50 years.
- Only males included in this study

3.6.2 Exclusion criteria

- Visual field defects
- Movement disorders
- History of seizures
- Recent fractures and soft tissue injuries
- Acute myocardial infarction
- severe Asthma
- recent surgery
- Uncontrolled Diabetes mellitus and hypertension
- COPD

3.7 Study duration

30 days

3.8 Measurement Tool

- 10 meter walk test
- Functional ambulation category
- **3.9 Materials used**
  - Assessment form
  - Data collection sheet
  - Stop watch
  - Pencil
  - Paper
  - Tread mill

3.10 Methodology

30 subject are selected and divided into two groups

The procedure was explained to subject.

Group A – treated with treadmill gait training

Group B – treated with over ground gait training

Hence both the group are treated and after 30 days functional walking ability and cadence is measured

3.11 Techniques

Patients in group A (experimental group) were given treadmill gait training. Gait training of the experimental group consisted as ambulating on a motor driven treadmill, which was adjusted to the subjects comfortable walking speed. Generally, during the treadmill training the subjects held on to a horizontal bar at their front or side. And the therapist standing on the floor beside, then provided assistance with hipflexion and foot placement as needed.

However with the more limited or apprehensive subjects treadmill training began with the therapist standing behind the subject on the treadmill, guarding the subject and providing manual assistance with hip flexion as needed. Actual walking time during training sessions was, 4 minutes per day during the first week, 6 minute per day during the second week, and 8 minute per day during the third week, 10 minutes per day during 4^{th} week. Total intervention periods (including resting periods) generally ranged between 8 – 20 minutes. Gait training of the control group consisted of ambulating on floor surface at a comfortable speed using walking aids, assistance and resting periods as needed.

During this study all subjects from both the control and experimental groups continued to receive five daily physical therapy treatment per week, which includes mobility exercise like passive range of motion exercise, active range of motion exercise, active resisted range of motion exercise, resisted exercise and the patient also given gait training in parallel bar, walking sideways parallel bar, walking unaided and stair climbing exercises

DATA ANALYSIS AND INTERPREATION

The data collected was subjected to paired 't' test individually for group A and group B using formulas.

Formula 1

$$\bar{d} = \sum d/n$$

Where,

d = difference between pre test and post test values

$\bar{d}$ = is the mean value of d

n = is the number of subjects

Formula 2:

Standard deviation SD =

$$\sqrt{\frac{\sum (d-\bar{d})^2}{(n-1)}}$$

Formula 3:

Standard Error (S.E) = $\frac{SD}{\sqrt{n}}$

't' calculated value = $\frac{\bar{d}}{S.E}$

Formula 4:

't' cal $= \frac{d}{S.E}$

Where, t cal is the 't' calculated value

$\bar{d}$ = mean of deviation

n = total number of subjects

s = standard deviation

Σd^2 = sum of squared deviation

4. Independent 't' test

$$t = \frac{\bar{x}_1 - \bar{x}_2}{s}\sqrt{\frac{n_1 n_2}{n_1 + n_2}}$$

Where S = $$\sqrt{\frac{\sum (x_1 - \bar{x}_1)^2 + \sum (x_2 - \bar{x}_2)^2}{n_1 + n_2 - 2}}$$

$\bar{X}_1$ = Mean of Control group

$\bar{X}_2$ = Mean of Experimental group

n_1 = Number of Subjects in Control group

n_2 = Number of Subjects in Experimental group

S = Standard Deviation

Data were collected from 30 patients analysed using paired 't' test and Independent 't' test to find out within group difference. All data was analysed using SPSS version 10.0.

TABLE I

DESCRIPTIVE DATA OF EXPERIMENTAL GROUP

S.No	AGE Year	SEX	10 METER WALK TEST	
			Pre-test	Post test
1	46	M	82	92
2	47	M	81	90
3	48	M	83	94
4	49	M	82	92
5	50	M	81	90
6	48	M	84	94
7	47	M	82	92
8	45	M	80	91
9	48	M	81	91
10	47	M	82	92
11	46	M	83	94
12	48	M	84	95
13	49	M	82	92
14	50	M	80	90
15	48	M	81	92

TABLE-2

DESCRIPTIVE DATA OF CONTROL GROUP

S.No	AGE Year	SEX	10 METER WALK TEST	
			Pre-test	Post test
1	46	M	82	86
2	47	M	81	85
3	48	M	82	87
4	45	M	80	84
5	46	M	81	85
6	47	M	82	86
7	49	M	83	87
8	46	M	81	86
9	48	M	82	87
10	46	M	83	87
11	47	M	84	86
12	49	M	83	87
13	50	M	84	87
14	46	M	82	84
15	47	M	82	85

TABLE - 3

DESCRIPTIVE DATA OF CONTROL GROUP

S.No	AGE Year	SEX	FUNCTIONAL AMBULATION CATEGORY	
			Pre-test	Post test
1	46	M	2	3
2	47	M	2	3
3	48	M	3	3
4	45	M	2	3
5	46	M	2	3
6	47	M	3	3
7	49	M	2	3
8	46	M	2	2
9	48	M	2	3
10	46	M	2	3
11	47	M	2	3
12	49	M	2	3
13	50	M	3	3
14	46	M	2	3
15	47	M	2	3

TABLE - 4

DESCRIPTIVE DATA OF EXPERIMENTAL GROUP

S.No	AGE Year	SEX	FUNCTIONAL AMBULATION CATEGORY	
			Pre-test	Post test
1	46	M	2	5
2	47	M	2	5
3	48	M	2	5
4	49	M	2	4
5	50	M	3	5
6	48	M	2	5
7	47	M	3	5
8	45	M	2	4
9	48	M	3	5
10	47	M	2	5
11	46	M	3	5
12	48	M	2	5
13	49	M	2	5
14	50	M	3	5
15	48	M	2	5

TABLE-5
PRE TEST MEAN AND STD.DEVIATION OF FUNCTIONAL AMBULATION CATEGORY

GROUP	N (No. of Subjects)	MEAN	STD. DEVIATION
CTRL GP	15	2.27	0.46
EXP GP	15	2.33	0.49

TABLE -6
POST TEST MEAN AND STD. DEVIATION OF FUNCTIONAL AMBULATION CATEGORY

GROUP	N (No. of Subjects)	MEAN	STD. DEVIATION
CTRL GP	15	2.87	0.35
EXP GP	15	4.87	0.35

TABLE-7
PRE TEST MEAN AND STD. DEVIATION OF 10 METER WALK TEST

GROUP	N (No. of Subjects)	MEAN	STD. DEVIATION
CTRL GP	15	82.14	1.9
EXP GP	15	81.85	1.25

TABLE -8
POST TEST MEAN AND STD. DEVIATION OF 10 METER WALK TEST

GROUP	N (No. of Subjects)	MEAN	STD. DEVIATION
CTRL GP	15	85.93	1.10
EXP GP	15	92	1.60

INTERPRETATION OF DATA:

STATISTICAL ANALYSIS OF FUNCTIONAL AMBULATION CATEGORY AND 10 METER WALK TEST OF CONTROL GROUP USING PAIRED T TEST

TABLE- 9

GROUP CTRL	MEAN		SD	t	DF
FUNCTIONAL AMBULATION CATEGORY	PRE	2.27	.46	3.67	14
	POST	2.87	.35		
10 METER WALK TEST	PRE	82.14	1.9	19.6	14
	POST	85.93	1.10		

Interpretation- functional ambulation category of control group

Above TABLE shows the mean of the pre test data for the control group as 2.27 ± (SD) and post test value as 2.87±.35 (SD).The calculated t value is 3.67 which is greater than that of table value(2.145). It indicates that there is significant difference between pretest and post values of functional ambulation category of lower extremity in control group

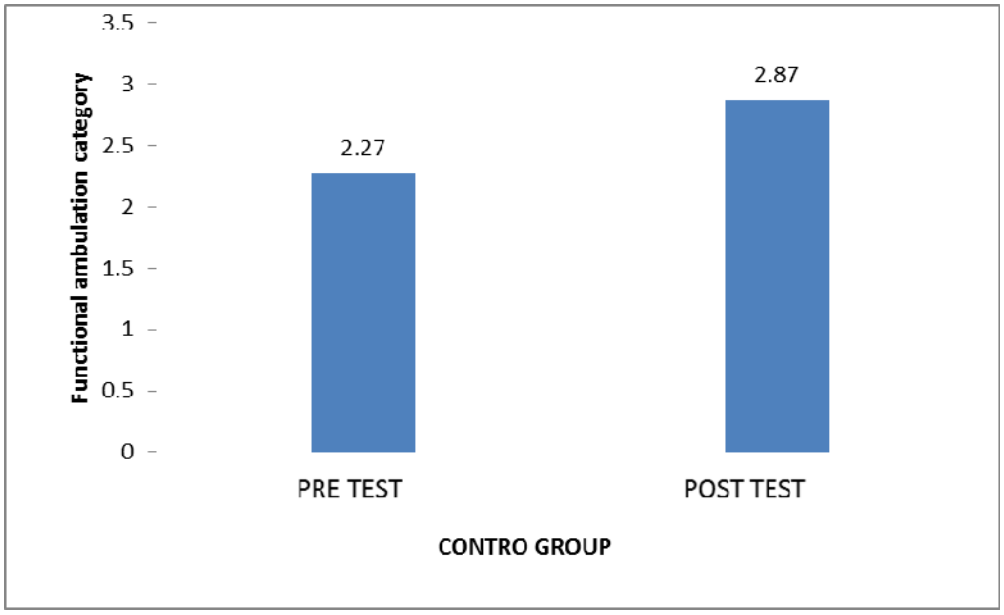
Interpretation-10 meter walk test of control group

Above TABLE shows the mean of the pretest data for the control group as 82.93±1.9(SD) and post test value as 85.93±1.10(SD).The calculated t value is 19.6 which is greater than that of table value(2.145). It indicates that there is

significant difference between pretest and post test values of 10 meter walk test of lower extremity in control group

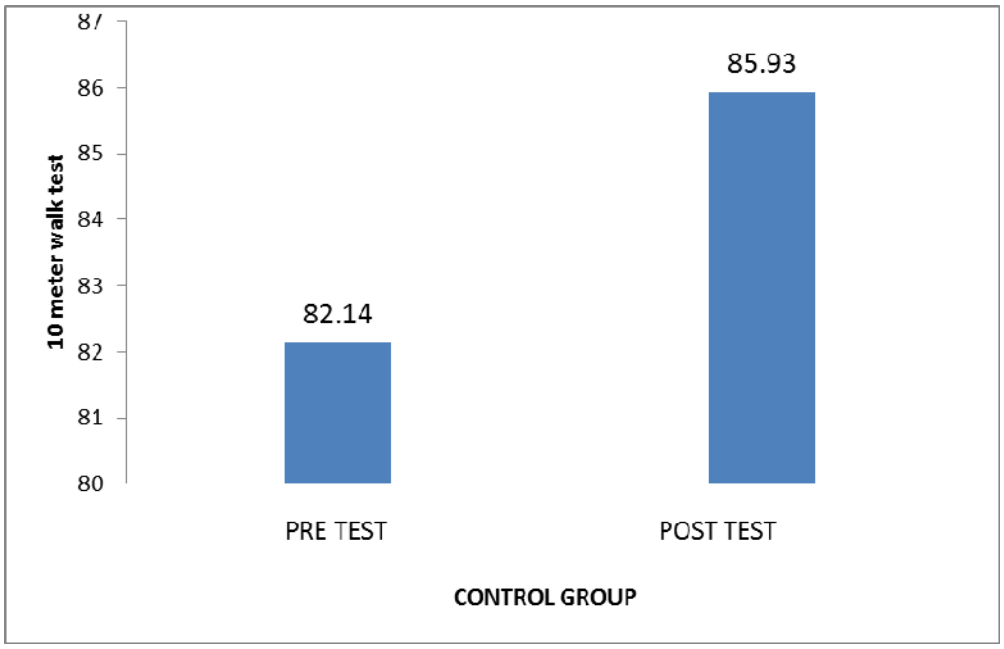
GRAPH- I

PRE TESTAND POST TEST VALUE OF FUNCTIONAL AMBULATION CATEGORY OF CONTROL GROUP



GRAPH- 2

PRE TESTAND POST TEST VALUE OF 10 METER WALK TEST OF CONTROL GROUP



STATISTICAL ANALYSIS OF FUNCTIONAL AMBULATION CATEGORY AND 10 METER WALK TEST OF EXPERIMENTAL GROUP USING PAIRED 't' TEST

TABLE 10

GROUP EXP	MEAN		SD	t	DF
FUNCTIONAL AMBULATION CATEGORY	PRE	2.33	.49	19	14
	POST	4.87	.35		
10 METER WALK TEST	PRE	81.85	1.25	52.8	14
	POST	92	1.60		

Interpretation-functional ambulation category of experimental group

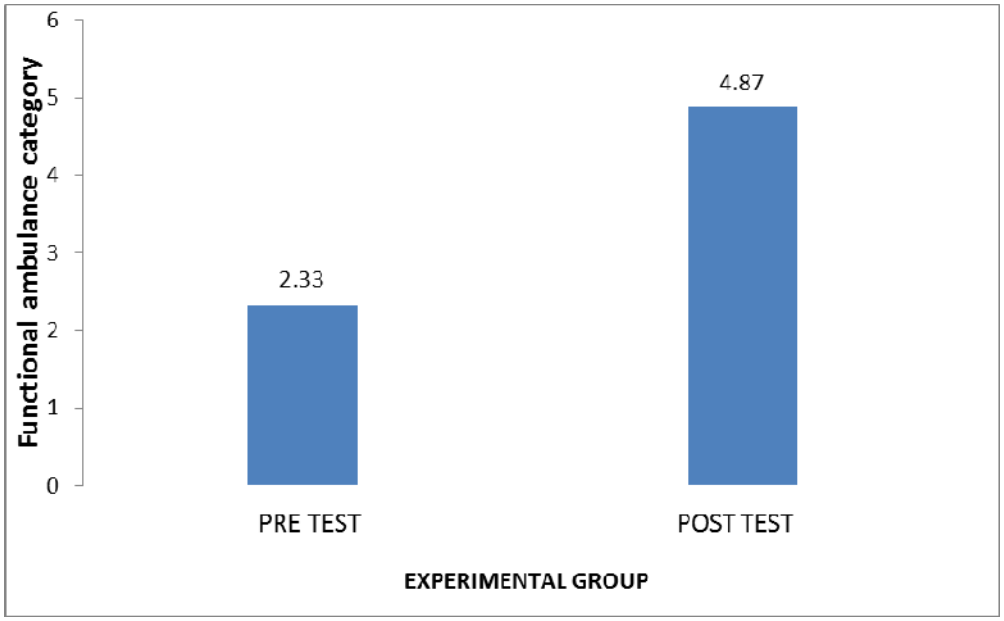
Above TABLE shows the mean of the pre test data for the experimental group as 2.33±.49 (SD) and post test value as 4.8± .35 (SD).The calculated t value is19 which is greater than that of table value(2.145). It indicates that there is significant difference between pretest and post values of functional ambulation category of lower extremity of experimental group.

Interpretation-10 meter walk test of experimental group

Above TABLE shows the mean of the pre test data for the experimental group as 81.85±1.25 (SD) and post test value as 92± 1.6 (SD).The calculated t value is 52.8 which is greater than that of table value(2.145). It indicates that there is significant difference between pretest and post test values of 10 meter walk test of lower extremity of the experimental group.

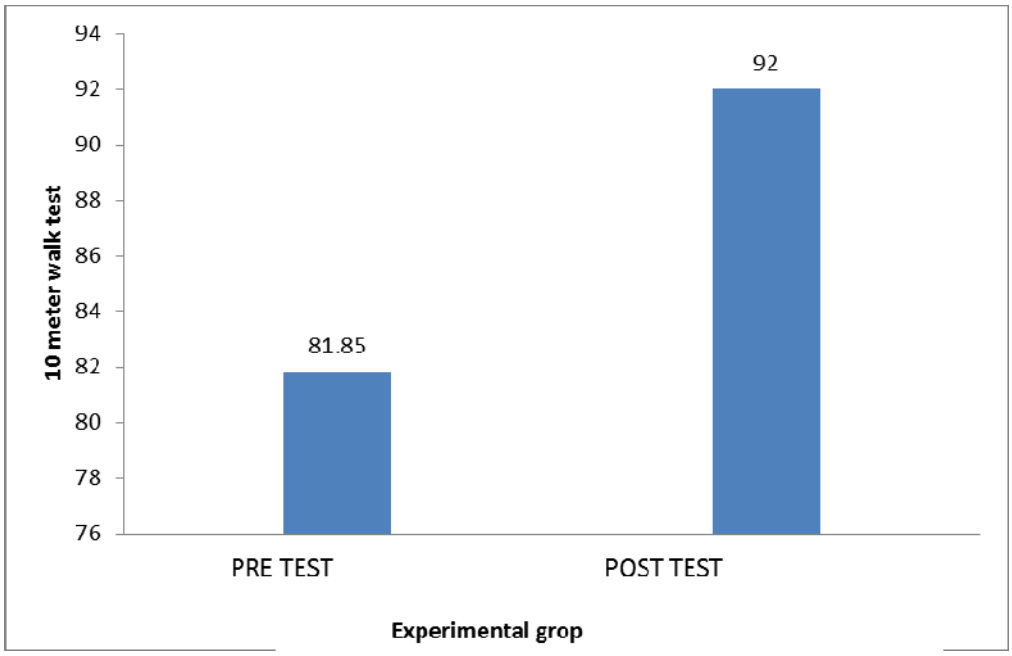
GRAPH- 3

PRETEST AND POST TEST VALUE OF FUNCTIONAL AMBULATION CATEGORY OF EXPERIMENTAL GROUP



GRAPH- 4

PRE TEST AND POST TEST VALUE 10 METER WALK TEST EXPERIMENTAL GROUP



STASTICAL ANALYSIS OF FUNCTIONAL AMBULATION CATEGORY AND 10 METER WALK PRE TEST VALUE USING INDEPENDENT T TEST

TABLE 11

EXPERIMENTAL AND CONTROL GROUP PRE TEST VALUE	MEAN		SD	t	DF
FUNCTIONAL AMBULATION CATEGORY	EXP	2.33	.49	.358	28
	CTRL	2.27	.46		
10 METER WALK TEST	EXP	82.13	1.13	.61	21
	CTRL	81.87	1.25		

INTERPRETATION FUNCTIONAL AMBULATION CATEGORY OF LOWER EXTRIMITY CONTROL AND EXPERIMENTAL GROUP PRETEST VALUE

Above TABLE shows the mean of pre test data for experimental group as 2.33 ±.49(SD)the calculated t value is .38 and control group mean 2.27±.46 and calculated t value is .38 for both experimental and control group. It indicates that there is no significant difference between experimental and control group.

INTERPRETATION-10 METER WALK TEST OF LOWER EXTRIMITY CONTOL AND EXPERIMENTAL GROUP PRETEST VALUE

Above TABLE shows the mean of pretest data for experimental group as 82.13±1.13 (SD) the calculated t value is .61 and control group mean 81.87±1.13 and calculated t value is .61 for both experimental and control group. It indicates that there is no significant difference between experimental and control group

STASTICAL ANALYSIS OF FUNCTIONAL AMBULATION CATEGORY AND 10 METER WALK POST TEST VALUE USING INDEPENDENT T TEST

TABLE 12

EXPERIMENTAL AND CONTROL GROUP POST TEST VALUE	MEAN		SD	t	df
FUNCTIONAL AMBULATIONAL CATEGORY	EXP	4.87	.35	15.57	28
	CTRL	2.87	.35		
10 METER WALK TEST	EXP	92.07	1.10	12.34	28
	CTRL	85.93	1.58		

INTERPRETATION- FUNCTIONAL AMBULATION CATEGORY OF LOWER EXTREMITY CONTROL AND EXPERIMENTAL GROUP POST TEST VALUE

Above TABLE shows the mean of post test data for experimental group as 4.87±.35 (SD) the calculated t value is 15.57 and control group mean 2.87±.35 and calculated t value IS 15.57 for both experimental and control group. It indicates that there is a significant difference experimental group value than control group.

INTERPRETATION- 10 METER WALK TEST OF LOWER EXTRIMITY CONTROL AND EXPERIMENTAL GROUP POST TEST VALUE

Above TABLE shows the mean of post test data for experimental group as 92.07.±1.58 (SD) the calculated t value is 12.34 and control group mean 85.93±1.10 and calculated t value is 12.34 for both experimental and control group. It indicates that there is a significant difference in experimental group value than control group.

5. RESULTS

FUNCTIONAL AMBULATION CATEGORY

- Effectiveness of Control Group (Conventional Physiotherapy)

While comparing the pre-test and post test values of control group using Paired 't' test, the calculated t value is 3.67 whereas the table value is 2.144786681.Since the calculated value is more than critical value, it states that there is significant difference between the pre-test and post-test values of control group. When comparing the mean values of both, the post-test mean value is 2.87 which are greater than the pre-test mean value 2.27Hence it confirms that there is a significant improvement in post-test control group than pre-test control group.

- Effectiveness of Experimental Group (treadmill training and Conventional Physiotherapy)

While comparing the pre-test and post test values of experimental group using Paired 't' test, the calculated t value is 19 whereas the table value is 2.144786681.. Since the calculated value is more than the critical value, it states that there is significant difference between the pre-test and post-test values of experimental group. When comparing the mean values of both, the post-test mean value 4.87which is greater than the pre-test mean value 2.33. Hence it confirms that there is a significant improvement in post-test experimental group than pre-test experimental group.

10 meter walk test

Effectiveness of Control Group (Conventional Physiotherapy)

While comparing the pre-test and post test values of control group using Paired ‘t’ test, the calculated t value is 19.6 whereas the table value is 2.144786681.Since the calculated value is more than critical value, it states that there is significant difference between the pre-test and post-test values of control group. When comparing the mean values of both, the post-test mean value is 85.93 which are greater than the pre-test mean value 82.14 hence it confirms that there is a significant improvement in post-test control group than pre-test control group.

- Effectiveness of Experimental Group (treadmill and conventional physiotherapy)

While comparing the pre-test and post test values of experimental group using Paired ‘t’ test, the calculated t value is 52 whereas the table value is 2.144786681.. Since the calculated value is more than the critical value, it states that there is significant difference between the pre-test and post-test values of experimental group. When comparing the mean values of both, the post-test mean value 92which is greater than the pre-test mean value81,85. Hence it confirms that there is a significant improvement in post-test experimental group than pre-test experimental group.

6. DISCUSSION

This study was an experimental comparative approach, which studied the effectiveness of treadmill training in improving functional walking ability and cadence in stroke patients. The outcome was measured using functional ambulation category (FAC) and 10 meter walk test. It is has been shown to a valid and reliable tool for the measurement of walking ability and cadence following stroke. The control group was given conventional physical therapy which includes mobility exercise like passive range of motion exercise, active range of motion exercise, active resisted range of motion exercise, resisted exercise and the patient also given gait training in parallel bar, walking sideways parallel bar, walking unaided and stair climbing exercises

Treadmill training is a widely using concept in rehabilitation settings. Treadmill walking therapy has been promoted as a treatment strategy to improve gait. It has been suggested that treadmill training may offer some benefits beyond those experienced through normal walking alone. The patients selected for the study are first episodes of right MCA stroke.

The gait of a patient with hemiparesis is markedly slower than that as a normal person. So the patient suffers from deficits in their functional ambulation capacity, balance, walking velocity, cadence, stride length, temporal gait pattern and muscular activity pattern. The study indicates that stroke survivors in early stage of rehabilitation may achieve significant gains in many of their gait characteristics. Moreover results indicate that for some gait characteristics

treadmill training may be more effective than over ground ambulation. The research suggests that the differences in the magnitude of recovery of the two groups could be due to the difference in gait training technique.

Some investigators report that treadmill training can be improve selected components of gait biomechanics and reduce the energy coast of floor walking in stroke patients.

The percentage of time spend by stroke survivors on the paretic limb during the single stance period was shorter than normal healthy individuals. This for it is of major significant that in contrast to gait training on a stationary treadmill training increased the single stance period of paretic leg.

Functional walking ability and cadence improved significantly only in the experimental group. The difference between average post treatment FAC (functional ambulation category) score of control group and the average post treatment FAC score of experimental group may have clinical significance. which indicate that the experimental group training by treadmill has a better ability to in egotiate stairs and uneven surfaces, which is one of the important determinants of community independence

According to Li-Yuan Chane walking on inclined treadmill was most stable pattern and the increased average muscle activity. Improvement in gait velocity of hemiplegic subjects has been shown to be related to increase in stride length as well as in cadence. Significant improvement in stride length observed only in the experimental group. The possible explanation for the increased stride length of the experimental group is due to increased hip flexion in treadmill

training, which has been demonstrated in treadmill ambulation of healthy individuals. Other possible explanation for the increase in stride length observed in the experimental group may be may related to significant EMG activity of the median gastronemius muscle in treadmill training. This may indicate an increase in median gastronemius muscular activity in push off phase of paretic limb of the experimental group, which has been shown to be importance for the power generation need for walking.

Based on above study, the present study concluded that inclined treadmill was most stable pattern and increase average muscle activity than in overground gait training

Mechanism

The mechanism by which treadmill training may affect the gait of stroke survivors is due to,

- The activation of a spinal generator.
- Greater maximal hip flexion and cadence and decrease in stance time

7. CONCLUSION

The study proves treadmill training may be used as a an effective treatment for improving functional walking ability in patient with stroke so treadmill training along with conventional physical therapy may be used as a effective treatment program in improving functional walking ability in post stroke hemi paretic patients. This is a simple and coast effective method and may help the patients to improve their quality of life

Hence taking into account the positive results of the study it can be concluded the treadmill training may be introduced as an effective treatment in improving functional walking ability and cadence after stroke.

8. SUGGESTIONS

- The study can be done with large number of sample
- The study with more duration is recommended
- Robotically assisted treadmill gait training can be useful in patients in the early phase of stroke
- Follow up programs can be included to know the long term effect of treatment
- Body weight support gait training could be given in addition.

LIMITATION

- This study was done for a short duration
- The study was conducted only on males
- The study was applied for age group between 45 – 50 years
- Sample size was small
- Used tool may produce human errors
- The study does not include follow up program
- Only some of the possible gait parameters were taken in to the study

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ANNEXURE – I

MEASURING TOOL

Functional Ambulation Category

Level 0-The person cannot walk at all or requires the help of two or more people.

Level 1-The person needs continuous support from one person who helps to carry the patients weight and helps with balance.

Level 2-The person is dependent on the continuous or intermittent support of one person to help with balance or coordination.

Level 3- The person needs only verbal supervision.

Level 4-Help is required on stairs and uneven surfaces.

Level 5-The person can walk independently anywhere.

10 Meter walk test

10 meter test is the common velocity test. The patient is instructed to walk a distance of 10 meter, the time needed for the 10 meter distance is measured with a simple stop watch. The patient can walk either at his preferred velocity or at his maximum velocity, the test completed 2 times to calculate a mean value on two trials. To calculate the mean cadence the assessor counts the number of steps during 10 meter test.

ANNEXURE- 2

ASSESSMENT FORM

A. DEMOGRAPHIC DATA

Name:

Age: Date of admission :

Sex: Date of assessment:

Occupation:

Marital status:

Chief complaints:

B. HISTORY

Present medical history

a) Onset:

b) Duration:

c) Symptoms:

Past medical history

Diabetes Mellitus : Yes/No

Duration:

Detected now/…..years

Medication : Yes/No, regular/irregular

Present status : Controlled/uncontrolled

Any other relevant illness : Yes/No

Family History

Personal History

a) Physical activities : Active/Inactive

b) Smoking and duration

c) Alcohol intake : Yes/No

d) Personality type : Calm/Anxious

Socioeconomic History

C. ON OBSERVATION

Physical built

Attitude of the limb

Tropical changes

External appliances

Others

D. ON PALPATION

Warmth

Tenderness

Swelling

E. ON EXAMINATION

1. Vital signs

Heart rate

Blood Pressure

Respiratory

Temperature

2. Neurological Examination

- Level of consciousness(GCS)
- Mini mental state test

Memory: Short/Intermediate/Long

Orientation

Intelligence

Attention

Speech

Cranial Nerve Examination

3. Motor Examination

a) Power

Upper limb Right Left

Lower Limb Right Left

b) Tone

Upper Limb

Lower Limb

c) Reflexes

Superficial reflex

Deep reflex

d) Voluntary control

e) Range of motion

Upper Limb Right Left

Lower Limb Right Left

4. Sensory examination

a) Exteroception: normal/abnormal

Touch

Temperature

Pain

b) Proprioception: normal/abnormal

Joint position sense

Kinesthetic sense

Vibration

c) Combined and cortical sensation: normal/Abnormal

Stereogonosis

Tactile localization

Two point discrimination

Barognosis

Graphaesthesia

5. Gait

Normal/Spastic/Ataxic/Hemiplegics

Cadence: Symmetrical/Asymmetrical

Arm swing

Base: Narrow/Broad

6. Co-ordination: Equilibrium/Non equilibrium

7. Balance

8. Posture

9. Deformity

10. Bladder and Bowel

11. Cranial Nerve Examination

12. Hand function:

Normal/Partially

Affected moderately

Affected fully

Affected

F. INVESTIGATION

C T Scan

MRI

Other investigations

Blood

EEG

G. PROBLEM LIST

Primary

Secondary

H. PROVISIONAL DIAGNOSIS

I. TREATEMENT

Goals

Means

J. FOLLOW UP

CONSENT FORM

I. ……..voluntarily consent to participate in the research study named

"A STUDY OF OVERGROUND VERSUIS TREADMILL TRAINING TO IMPROVE WALKING ABILITY IN PATIENTS WITH STROKE"

The researcher had explained to me the treatment approach in detail, risk of the participants and had answered the questions related to the research to my satisfaction.

Participant's Signature:

Signature of the Witness:

Signature of the Researcher